3.1.6. CALIBRATION OF CMDL DOBSON SPECTROPHOTOMETERS

Ten Dobson ozone spectrophotometers were calibrated during 1993. Table 3.10 lists all of the instruments calibrated and the resulting calibration difference expressed as a percent difference in ozone. This percent difference is between ozone calculated from the test instrument and the standard instrument measurements with the ADDSGQP observation type at a Mu value of 2, and a total ozone value of 300 DU, before any repair or calibration adjustment is made. The table also lists the place of the calibration and the standard instrument used.

TABLE 3.10. Dobson Ozone Spectrophotometers Calibrated in 1993

Station	Instrument Number	Calibration Date	Calibration Correction (%)	Standard Number	Place
Bologna, Italy	66	May 25	-0.8%	65	Hradec Kralove
Aswan, Egypt	69	May 25	-0.6%	65	Hradec Kralove
Hradec Kralove, Cêska	74	May 25	-0.3%	65	Hradec Kralove
Irene, S. Africa	89	May 25	-1.0%	65	Hradec Kralove
St. Petersberg, Russia	102	May 25	0.0%	65	Hradec Kralove
MLO	76	Aug. 18	-1.3%	83	MLO
SMO	42	June 14	-0.1%	83	MLO
Tamanrasset, Algeria	11	N/A	N/A	65	Boulder
Tehran, Iran	109	N/A	N/A	83	Boulder
Bismarck, N. Dakota	33	Sept. 29	-0.5%	83	Bismarck

CMDL participated in an international Dobson spectrophotometer calibration at Hradec Kralove, Czech Republic, May 20-30, 1993, as part of its role as the world center for Dobson calibrations. Five instruments were calibrated with respect to secondary standard Dobson instrument 65. Four of the instruments had the optical wedge calibration performed.

The SMO Dobson instrument 42 was sent to MLO in June and the calibration level checked against world standard Dobson spectrophotometer 83. The instrument was returned to SPO and an encoder installed for semi-automated operation.

In 1992 it was noticed that the daily ozone values reported for the MLO Dobson instrument 76 were higher than the daily average ozone values calculated from the "absolute calibration" of world standard Dobson spectrophotometer 83 operated at the same station. This difference appeared after July 25, 1992. Dobson instrument 76 was formally intercompared with standard Dobson instrument 83 in the manual mode in June and in the automated mode in August. The average difference in the August intercomparison was 1.3% higher for the Dobson 76 with even higher values closer to noon. A new calibration scale was defined for the Dobson 76, based on the August intercomparison, to be used from July 25, 1992, onward. There is no known explanation for the calibration shift on July 25, 1992.

The CMDL Dobson instrument 33, operated by the Bismarck NWS site, was intercompared with the standard Dobson spectrophotometer 83 in late September. Dobson instrument 33 had the wedge calibration performed and the encoder installed for semiautomated operation.

Two Dobson instruments of the WMO GAW program were rebuilt and calibrated in Boulder as part of CMDL's function as the world center for Dobson calibrations. Dobson instrument 11 operated in Toulouse, France, before it was donated to the WMO and had been modified with an encoder and special electronics. Unfortunately, the original circuit diagrams and part of the electronics were missing. The instrument was stripped and rebuilt as a normal instrument. This instrument was sent to Tamanrasset, Algeria, for use at the newly opened WMO Global Environmental Fund/Global Atmosphere Watch (GEF/GAW) baseline station. A representative of the WMO and of the Czech Republic Hydrometeorological Institute aided in this project. The Tehran, Iran, Dobson instrument 109 was optically realigned, and the electronics were replaced with a solid-state version. It was returned to its station in 1994.